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The Protective Effect of Quercetin in Animal Models of Pulmonary Fibrosis: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 March 2025 and was last updated on 28 March 2025.

INTRODUCTION

Review question / Objective The objective of this study is to address the data fragmentation and methodological heterogeneity in preclinical research.

Condition being studied In recent years, an increasing number of studies have indicated that quercetin holds potential therapeutic effects on pulmonary fibrosis. The existing research predominantly focuses on animal models and in vitro mechanism exploration, with clinical translation evidence remaining insufficient.

METHODS

Participant or population Animal Models of Pulmonary Fibrosis.

Intervention Treatment with quercetin.

Comparator Treatment with 0.9% sodium chloride solution.

Study designs to be included A Systematic Review and Meta-Analysis.

Eligibility criteria Exclusion criteria: (1) Cell experiments, clinical studies, reviews, or conference abstracts. (2) Studies with incomplete data (e.g., figures provided without numerical annotations), duplicate publications, or those with full-texts that are not accessible.

Information sources PubMed、Web of Science、Embase、Cochrane Library 、Ovid、Google Scholar.

Main outcome(s) Hydroxyproline content, Ashcroft score, α-smooth muscle actin (α-SMA), Collagen I (Col I), Tumor necrosis factor-alpha (TNF-α), Interleukin-6 (IL-6), Interleukin-1 beta (IL-1β), Transforming growth factor-beta 1 (TGF-

β1), total cell count, leukocyte count, neutrophils, lymphocytes, eosinophils, macrophages, superoxide dismutase (SOD) activity, malondialdehyde (MDA) level, glutathione (GSH), catalase (CAT), nitric oxide (NO), thiobarbituric acid reactive substances (TBARS).

Quality assessment / Risk of bias analysis The SYstematic Review Centre for Laboratory animal Experimentation.

Strategy of data synthesis Data analysis was performed using RevMan 5.4. Continuous variables were expressed as standardized mean differences (SMD) with 95% confidence intervals (CI). Heterogeneity was assessed using the I^2 statistic ($I^2 > 50\%$ indicating significant heterogeneity). A random-effects model was used when $I^2 > 50\%$, and a fixed-effects model was applied when $I^2 < 50\%$. Publication bias was evaluated using funnel plots.

Subgroup analysis None.

Sensitivity analysis None.

Country(ies) involved China.

Keywords Quercetin; Pulmonary Fibrosis; Oxidative Stress; Inflammation; Animal Models; Systematic Review; Meta-analysis.

Contributions of each author

Author 1 - Lanhua Cai - Author 1 drafted the manuscript,methodology, conceptualization, resources, writing—original draft and funding acquisition, supervision.
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